Original Article

Technostress among Medical Students and its Impact on Perceived Academic Productivity at a Private Sector Medical College, Lahore

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Abstract

Background: Increased exposure to information communication technology (ICT) can result in technostress among students which affects their physical and psychological well-being as well as their academic productivity.

Objective: To determine the technostress among medical students along with associated factors and the relationship between technostress and perceived academic productivity.

Methods: This analytical cross-sectional study was conducted from May 2024 to October 2024 among MBBS students of Lahore Medical and Dental College, Lahore. Using convenience sampling technique, 586 participants were recruited. A validated Technostress Questionnaire was used having questions on Likert scale, with 5 representing strongly agree and 1 representing strongly disagree. Scores ranging from 1–2.33, 2.34–3.66 and 3.67–5 were considered as low, medium and high level. Data was analyzed using SPSS version 27. Independent sample t-test, ANOVA and multiple regression were applied. To determine relationship between technostress and perceived academic productivity, Pearson correlation coefficient was calculated. A p-value of ≤ 0.05 was deemed significant.

Results: The mean age of participants was 21.27±2.07 years. The mean value of technostress was 2.71±0.56 signifying the medium level of technostress. Significant association was found between age (p=0.009), academic year (p=0.03), years of using ICT(p=0.01), number of ICT being used (p=0.04), perceived academic productivity(p=0.004) and technostress. A significant but weak positive correlation between technostress and perceived academic productivity (r=0.12) was observed.

Conclusion: The students had medium level of technostress. Age, academic year and no of ICT used were significantly associated with technostress. There was a weak positive correlation between technostress and perceived academic productivity.

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Introduction

Information and communication technologies (ICTs), are becoming more and more integrated into both personal and professional life. Despite the positive aspect of ICT, some drawbacks related to its

use have also been noted.[1] Use of ICT can lead to stress, which is defined as an imbalance between a person's perceived resources and demands and their capacity to meet those demands.[2]

Brod (1984) was the first to adopt the word "technostress," defining it as a contemporary disease of adaption brought on by an inability to deal with new computer technology in a healthy way.[3]

The emotional, mental, and physical strain of managing today's technology obligations and diversions is referred to as technostress.[4] According to Tarafdar et al. (2007) technostress is an individuals' difficulties adapting to modern technology when they are unable to cope with it, and Techno-overload, Techno-invasion, Techno-complexity, Techno-insecurity, and Techno-uncertainty are the five components of the multi-dimensional scale that was developed by them.[5] The scale contained 23 items. The mean scores of items 1-4, 5-8, 9-13, 14-15, and 16-19 of the scale were used to measure techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty, respectively. Higher mean scores denote high level of stress.

Today's learners are frequently referred to as "digital natives". Students utilize ICT gadgets to facilitate communication and collaboration as well as to access formal and informal learning contexts. Students use ICTs for leisure and social interaction in addition to their educational purposes. The incorporation of new social media platforms, greatly improve communication, work, leisure and learning.[6] Techno stress is linked with the excessive use of ICTs, either through exposure to mobile devices and to fixed devices such as computers or any other gadget.[7]

Students who are constantly connected may experience technostress. They become enmeshed in multitasking and lack mental rest, exhibit negative attitudes and blur the boundaries between personal and professional life.[8] The stress resulting from technology can have a negative effect on physical and mental health of youth and their social relationships.[9]

Techno-overload, Techno-invasion, Techno-complexity, Techno-insecurity, and Techno-uncertainty are the five dimensions in which technostress presents itself behaviourally and mentally.[10]. When an ICT user is compelled to work longer and faster, it's referred to as techno-overload. Techno-invasion occurs when an ICT user believes that the line separating his/ her personal and professional lives is blurred because of frequent connectivity or contact. An ICT user experiences "techno-complexity" when he or she feels that his or her computer skills are inadequate and must thus devote a substantial amount of time and effort to learning and understanding the multiple ICT aspects. Another form of stress that ICT users may face is techno-insecurity, which can be brought on by the introduction of new ICT or by the presence of peers who are more tech-savvy than they are. Techno-uncertainty is the situation in which an ICT user feels uneasy and disturbed since ICT is constantly changing and needs to be upgraded.[11]

According to a study done on university students in Paraguay, 47% of the participants reported having low to moderate levels of technostress, while 5% reported having severe levels.[12] The mean technostress was 2.91 ± 0.50, suggesting a moderate level of technostress among Egyptian medical students.[13] Another research of first-year students at a medical school in Delhi, India, revealed that 43% of participants had high and 57% of participants had moderate levels of stress.[14]

While professionals from a variety of backgrounds are affected by Technostress, students are a particularly vulnerable group. TS may result in learning challenges, dropout rates, and decreased productivity. The term "academic productivity" describes students' capacity to work effectively in their academics.[15] Academic productivity can be described as an individual's performance, accomplishments, and success in academic domains.[16] It is the degree to which students execute effectively in their academic tasks, not only exam scores.[17] The concept of perceived academic productivity relates to the students' perceptions of efficiency and work output in academic activities."

It is imperative that extensive research be done on technostress in order to reduce its negative effects and develop coping strategies. Studying medicine is a tough field. A medical student's academic performance, personal growth, and future

employment opportunities can all be adversely affected by low academic productivity. Very few researches have evaluated the effects of technostress on students, while the majority of the literature has concentrated on the detrimental effects of technostress on teachers, librarians, and staff. There is a paucity of empirical studies about TS among Pakistani medical students. Finding out how prevalent technostress is among medical students and how it affects their academic productivity is crucial. The study aimed to determine the technostress among medical students along with associated factors and the relationship between technostress and perceived academic productivity.

Methods

MBBS students of Lahore Medical and Dental College (LMDC), Lahore participated in this analytical cross-sectional study, which was carried out between May and October of 2024. Approval by institutional review board was obtained before the commencement of study. Sample size was calculated by Raosoft sample size calculator. Assuming an expected frequency of technostress of 52.6%[12], a confidence level of 95%, and margin of error of 5%, the minimum sample size was calculated as 376 participants. However, 586 subjects were recruited and surveyed.

Using convenience sampling technique, 586 students were included in the study. Undergraduate MBBS students of LMDC of both genders registered in 2024 and who used ICT were included. Students who denied to participate were excluded.

A validated tool, Technostress Questionnaire (TSQ)[15] was used to record technostress and perceived academic productivity. The first part of questionnaire contained the background information of the participants. The second section included 23 questions in a Likert scale with (1) representing strongly disagree and (5) representing strongly agree. Scores ranging from 1 – 2.33, 2.34 – 3.66 and 3.67 – 5 were considered as low, medium and high level. The tool is reliable with combined Cronbach's alpha of all dimensions above 0.80, i.e., techno-invasion, 0.78; techno-overload, 0.79; techno-complexity, 0.84; techno-uncertainty, 0.79; techno-insecurity, 0.70 and academic productivity,0.88.[15]

Data analysis was conducted using SPSS version 27. For categorical variables, descriptive statistics such as proportions and frequency were employed. For continuous variables including age, years of ICT experience, technostress, and academic productivity, mean and standard deviations were computed. To determine if background variables and mean technostress were associated, the independent sample t test and one-way ANOVA were used. The predictors were found using multiple regression analysis. Significant p-value was ≤ 0.05. To determine the direction and relationship between perceived academic productivity and technostress, the Pearson correlation coefficient (r) was computed.

Results

The participants' mean age was 21.3±1.78 years. Study included 337 (57.5%) females and 316(53.9%) day scholars. All students were using ICT devices and social media. Majority of students 369(63%) were using ICT for 5-10 years (mean±sd=8.86±3.74). Among total 450(76.8%) were using multiple devices. According to this study, all students were using social media and 429(73.2%) students were using three or more social media sites. Students from first year (n=118, 20.1%), second year (n=110, 18.8%), third year (n=102, 17.4%), fourth year (n=148, 25.3%) and final year (n=108, 18.4%) participated in the study.

Table 1: *Association of sociodemographic variables with technostress (n=586)*

Variables	Frequency (n)	Mean	Standard deviation	Standard error of mean	t-test	p value
Gender						
Male	249	2.7	0.57	0.036	-0.4	0.7
Female	337	2.71	0.56	0.03		
Residence						
Home	316	2.68	0.6	0.03	-1.4	0.17
Hostel	270	2.74	0.52	0.03		

➢Independent sample t test was applied

The mean value of technostress was 2.71±0.56 which signified medium level. Among the five constructs of technostress, Techno-invasion had the highest value

Table 2: *Association of background variables with technostress (n=586)*

Variables		Sum of square	df	Mean square	F	p value
Age	Between the groups	3.68	3	1.22	3.93	**0.009***
	Within group	181.63	582	0.31		
Academic year	Between the groups	3.41	4	0.85	2.72	**0.03***
	Within group	181.9	581	0.31		
No of ICT used	Between the groups	2.01	2	1	3.19	**0.04***
	Within group	183.3	583	0.31		
Use of social media sites	Between the groups	0.13	2	0.06	0.19	0.81
	Within group	185.18	583	0.32		
Years using ICT	Between the groups	2.85	2	1.43	4.55	**0.01***
	Within group	182.45	583	0.31		

*Statistically significant after applying one way ANOVA

Table 3: *Multiple logistic regression for factors associated with technostress among medical students (n=586)*

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B	
	B	Std. Error	Beta	t- test	Sig.	Lower Bound	Upper Bound
Constant	3.036	0.179		16.959	<.001	2.684	3.387
Age	-0.115	0.049	-0.187	-2.366	.018*	-0.211	-0.02
Gender	-0.001	0.049	-.001.	-0.027	0.979	-0.097	0.094
Residence	0.042	0.047	0.037	0.898	0.369	-0.05	0.135
Academic year	0.063	0.031	0.159	2.017	.044*	0.002	0.125
No of ICT used	-0.061	0.036	-0.073	-1.684	0.093	-0.131	0.01
No of social media sites used	-0.005	0.01	-0.019	-0.461	0.645	-0.024	0.015
Years of ICT use	-0.056	0.042	-0.058	-1.314	0.189	-0.138	0.027

*Statistically significant

(3.07±0.93) followed by Techno-overload (2.84±0.98). The values of other constructs were techno-uncertainty (2.68±1.09), techno complexity (2.49±0.93) and techno-insecurity (2.32±1.02).

Among total 586 participants, 151(25.8%), 408(69.6%) and 27(4.6%) participants had low, medium and high level of technostress, respectively.

Table 1 showed the association of gender and place of residence with technostress.

As seen in Table 2, significant association was found between technostress and age (p=0.009), academic year (p=0.03), years of using ICT(p=0.01), type of ICT being used (p=0.04) as well as perceived academic productivity(p=0.004).

A multiple regression analysis was run to predict technostress from gender, age, residence, academic year no of ICT used, no of social media sites used and years of ICT use. Age and academic year significantly predicted technostress as shown in Table 3.

Mean academic productivity score was 3.76±1.00 among participants. A weak positive correlation between technostress and perceived academic productivity (r=0.12) was observed. However, this association was significant (p=0.004)

Discussion

The present research added to the growing body of literature on technostress and was the first to be carried out in our region about this topic.

Overall, the study participants' mean score of 2.71±0.56 indicated a medium level of technostress. According to Upadhyaya et al., students' overall mean technostress level was 3.15, indicating a moderate level of technostress.[15] According to the findings of another study, the average degree of technostress among Indonesian university students was moderate (3.12 ± 0.53 out of 5.00).[16]

In this study, Techno-invasion showed the highest value (3.07±0.93) among the five constructs of technostress, followed by Techno-overload (2.84±0.98). According to another study by Asad et al., postgraduate students' mean scores for techno-overload and invasion were 3.65 and 3.79, respectively.[17] According to Torre et al., Techno-invasion got the highest mean score (3.0±1.1), followed by techno-uncertainty (2.9±1.2).[18]

According to the results of the current study, technostress peaked in the 20–21 years age group and lowest in the 24-26 years age group. The association between the age and mean technostress was statistically significant. Çoklar et al. described that as individuals age, their levels of technostress seem to increase. Participants' mean technostress scores were 2.97 for those below 20 years of age, 3.21 for those between 21 and 25 years, 3.27 for those between 26 and 30 years, and 3.32 for those over 31 years.[19] Another study conducted in India showed a significant difference between intensity of technostress and the age of the respondents.[20]

This study found no significant difference in technostress score of male (2.70±0.57) and female (2.71±0.56) students. A study at the University of Education, Winneba, found similar results, indicating that there was no statistically significant difference in the technostress scores of male (2.882±0.682) and female (2.977±0.677) gender.[21]

There was a significant difference between the technostress experienced by different academic year. MBBS students in their last year had the lowest levels of technostress, whereas those in their second and third years had the highest levels. Although no research has compared the technostress of MBBS students in different academic years, the second and third-year students' increased levels of ICT usage may be the cause of their higher technostress.

The current study's results clearly showed that students with less ICT experience had greater levels of technostress than students with over 10 years of ICT use. There was a statistically significant association. According to the Essel et al. study, students who had less ICT exposure experienced higher levels of technology-induced stress.[22] A study by Nimrod also discovered a significant association between a higher technostress score and less than ten years of use.[23] More seasoned internet and ICT users having greater confidence and computing proficiency had low level of technostress.

The new generation's life is becoming more and more reliant on information and communication technologies. According to the study's findings, students who used one or two ICT devices experienced higher levels of technostress, whereas those who used multiple devices experienced lower levels. Multiple devices use can lead to information overload, compelled multitasking, and stress for those who use them. A statistically significant association between a student's possession of devices and their level of technostress was shown in another study. The mean score was lower (3.08) for students who owned more than two gadgets and higher (3.23) for those who owned only one.[22,23]

The present study assessed the academic productivity as it is perceived by the students. The results showed that students reported high level of perceived academic productivity. A weak positive correlation was found between technostress and perceived academic productivity. The impact of technostress on academic productivity of students was investigated by Sethi et al. According to their research, academic productivity and technostress had a significant causal relationship but were inversely correlated.[24] All constructs of technostress were found to be strongly correlated with students' productivity, according to Yusuf et al.[25]

There were some limitations of this research. Due to cross-sectional type of study, it was not possible to establish a cause-effect relationship. Furthermore, it

is not generalizable because it was only conducted at one institution.

Conclusion

The medical students had medium level of technostress. Significant association was found between age, academic year, years of using ICT, number of ICT gadgets being used and technostress. Although significant but weak positive correlation between technostress and perceived academic productivity was observed. The findings of this study may help policymakers in developing strategies to improve students' coping with the challenges of technology. Medical institutions should identify the high-risk students and counsel them to reduce technostress. Our results suggest further research regarding the implications of technostress on the well-being of medical students. Future research may investigate the association of techno-inhibitor in solving the issues related to techno overload and techno invasion.

Ethical Approval: The Institutional Review Board, LMDC approved the study vide letter (IRB no LMDC/L-ORIC-08-2024).

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Authors' Contribution:

SM: Conception & design, analysis & interpretation of data, drafting manuscript

SD: Data analysis, critical revision for important intellectual content, final approval

FS: Acquisition of data, Literature search, drafting manuscript

INM: Acquisition of data, Literature search, data analysis

H: Acquisition of data, Literature search, drafting manuscript

HA: Acquisition of data, Literature search, drafting manuscript

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References

1. Mehmood K, Suhail A, Kautish P, Hakeem MM, Rashid M. Turning lemons into lemonade: Social support as a moderator of the relationship between technostress and quality of life among university students. Psychol Res Behav Manag. 2024:989-1006. doi: https://doi.org/10.2147/PRBM.S448989.
2. Vega-Muñoz A, Estrada-Muñoz C, Andreucci-Annunziata P, Contreras-Barraza N, Bilbao-Cotal H. Validation of a measurement scale on technostress for university students in Chile. Int J Environ Res Public Health. 2022;19(21):14493. doi: https://doi.org/-10.3390/ijerph192114493.
3. Mahapatra H, Bankira S, Sahoo NK, Bhuyan S. Relationship between techno stress and academic performance of university students. J Educ Soc Behav Sci. 2023;36(10):45-55. doi: 10.9734/-JESBS/2023/v36i101266.
4. Pothuganti S. Technostress: A comprehensive literature review on dimensions, impacts, and management strategies. Comput Hum Behav Rep. 2024;16:100475. doi: https://doi.org/10.1016-/j.chbr.2024.100475
5. Tarafdar M, Tu Q, Ragu-Nathan BS, Ragu-Nathan TS. The impact of technostress on role stress and productivity. J Manag Inf Sys. 2007;24(1):301-28. doi: https://doi.org/10.2753/MIS0742-1222240109
6. Ludvík E, Łukasz T, Milan K, Mária P, Gabriela P. How do first year university students use ICT in their leisure time and for learning purposes? Int J Cong Res Sci Eng Edu. 2020;8(2):35-52.
7. Fabiola Martínez G, Cristhian Prieto M, Gabriela Estrada E, Lorena Chamba S. Techno-stress levels in students of higher education institutions. J Humanit Soc Sci. 2022;3(7):34-40. doi: 10.5281/-zenodo.6947576
8. Ficapal-Cusí P, Peñarroja V, Enache-Zegheru M, Salazar-Concha C. Employee technostress: Analyzing the influence of sociodemographic characteristics on techno-stressors and their consequences. Int J Hum-Comput Int. 2024:1-4. doi: https://doi.org/10.1080/10447318.2024.2313926
9. Asad MM, Erum D, Churi P, Guerrero AJ. Effect of technostress on psychological well-being of post-graduate students: A perspective and correlational study of higher education management. Int J Inf Manag Data Insights. 2023;3(1):100149. doi: https://doi.org/10.1016/j.jjimei.2022.100149

10. Kim DG, Lee CW. Exploring the roles of self-efficacy and technical support in the relationship between techno-stress and counter-productivity. Sustainability. 2021;13(8):4349. doi: https://doi.org/10.3390/su13084349
11. Abd Aziz NN, Yazid ZN. Exploratory factor analysis of technostress among university students. Int J Acad Res Progress Educ Dev. 2021;10(3). doi:10.6007/IJARPED/v10-i3/10396
12. Torales J, Torres-Romero AD, Di Giuseppe MF, Rolón-Méndez ER, Martínez-López PL, Heinichen-Mansfeld KV, et al. Technostress, anxiety, and depression among university students: A report from Paraguay. Int J Soc Psychiatry. 2022;68(5):1063-70. doi: https://doi.org/10.1177/00207640221099416
13. Kasemy ZA, Sharif AF, Barakat AM, Abdelmohsen SR, Hassan NH, Hegazy NN, et al. Technostress creators and outcomes among Egyptian medical staff and students: A multicenter cross-sectional study of remote working environment during COVID-19 pandemic. Front Public Health. 2022;10:796321. doi: https://doi.org/10.3389/fpubh.2022.796321
14. Madaan N, Wundavalli L, Satapathy S. Techno stress among medical freshmen: An exploratory study. J Educ Health Promot. 2020;9(1):178. doi: 10.4103/jehp.jehp_242_19
15. Upadhyaya P, Acharya V. Impact of technostress on academic productivity of university students. Educ Inf Technol. 2021;26(2):1647-64. doi: https://doi.org/10.1007/s10639-020-10319-9
16. Hapsari EA, Rohmatullayaly EN, Widayati KA. Technostress and sleep quality among university students in Indonesia: A cross-sectional study. Asian J Soc Health Behav. 2024;7(4):197-202. doi: 10.4103/shb.shb_177_24
17. Asad MM, Erum D, Churi P, Guerrero AJ. Effect of technostress on psychological well-being of post-graduate students: A perspective and correlational study of Higher Education Management. Int J Inf Manag Data Insights. 2023;3(1):100149. doi: https://doi.org/10.1016/j.jjimei.2022.100149
18. La Torre G, De Leonardis V, Chiappetta M. Technostress: how does it affect the productivity and life of an individual? Results of an observational study. Public Health. 2020;189:60-5. doi: https://doi.org/10.1016/j.puhe.2020.09.013
19. Çoklar AN, Sahin YL. Technostress levels of social network users based on ICTs in Turkey. Eur J Soc Sci 2011;23(2):171-82.
20. Selvan SC, Kumar DN. The impact of techno stress among college students in Thoothukudi district with regard to their addictive smartphone usage. Studies in Indian Place Names. 2020;40(80):37-45.
21. Mattie ES. Assessing the effect of technostress on students' academic productivity in selected university in Central Region [Doctoral dissertation]. Winneba: University of Education Winneba; 2022 [cited 2024 August 27]. Available from: http://ir.uew.edu.gh:8080/bitstream/handle/123456789/2115/
22. Essel HB, Vlachopoulos D, Tachie-Menson A, Johnson EE, Ebeheakey AK. Technology-induced stress, sociodemographic factors, and association with academic achievement and productivity in Ghanaian higher education during the COVID-19 pandemic. Information. 2021;12(12):497. doi: https://doi.org/10.3390/info12120497
23. Nimrod G. Technostress in a hostile world: older internet users before and during the COVID-19 pandemic. Aging Ment Health. 2020; 26(3): 526–33. doi: https://doi.org/10.1080/-13607863.2020.1861213
24. Sethi D, Pereira V, Arya V. Effect of technostress on academic productivity: E-engagement through persuasive communication. J Glob Inf Manag. 2021;30(5):1-9. doi: 10.4018/JGIM.290365
25. Yusuf MJ, Daung AE, Mahdi A. Techno-stressors and productivity among university students. Int J Acad Res Bus Soc Sci. 2024;14(1):757-75 doi:10.6007-/IJARBSS/v14-i1/20080